Genesis team comes clean

Story by Linda Singleton

Imagine a room so clean that it would pass even the toughest white-glove test that any grandma could give it. Even more so, it would have no dust, airborne particles or organic matter visible to the naked eye.

Besides being an allergy sufferer's dream come true, such a room is now a reality for the JSC Genesis Mission Team that resides in Building 31-N. This group of dedicated professionals has been working diligently for the past four years to renovate and prepare cleanroom facilities in order to receive the Genesis spacecraft and curate the samples it retrieves.

The Mission

Known officially as the Genesis Discovery Mission, the purpose of this $240 million operation is to send solar wind "collectors" made of ultrapure, ultraclean materials outside of the influence of the Earth's magnetosphere. While in orbit 1.5 million kilometers above Earth, the Genesis spacecraft will collect a representative sample of the solar wind and then return that sample for analysis.

"The mission team – comprised of staff from Lockheed Martin, the Jet Propulsion Lab and JSC – hopes the solar wind samples will help them gain a better understanding of the origin and development of our solar system," said Eileen Stansbery, NASA/JSC team lead. "This information will provide a better understanding of how humans fit into the universe and help to answer questions about how the solar system is evolving and why planets differ from one another."

The spacecraft transporting the sample collectors was launched in August 2001 via a Delta 2 rocket from Kennedy Space Center. It is expected to return to Earth August 2004 in Utah. When the spacecraft returns, the Genesis team will be part of the crew to receive the spacecraft in Utah and immediately transfer it to JSC.

That's when "the real fun begins," said Karen McNamara, the NASA project manager who oversees JSC's participation in this mission.

A small team at JSC will deintegrate the payload, perform preliminary scientific assessment of the samples and begin allocating samples to the scientific community under the direction of a Headquarters-chartered committee.

Sample curation is scheduled through 2007, and allocation of those samples is expected to continue well beyond then. Some samples will even be stored in pristine condition to await future analytical testing as technology in this area advances.

However, there's much to accomplish before these events happen. "Even though the spacecraft won't return for another two years, the planning and preparation for the spacecraft arrival is, and will be, gearing up tremendously from now until it returns," McNamara said.

The JSC Team

Lockheed Martin team members working behind the scenes to prepare and maintain the research facility are Ron Bastien, Jim Holder, Terry Parker and Lisa Vidonic. Combined, these four have more than 65 years of experience with JSC's receiving, curation and sampling laboratories. Charged with overseeing the lab renovations and maintaining the ultraclean environment, Bastien, Holder, Parker and Vidonic keep a constant watch on the room's particle counts and air filtering system.

"Maintaining a cleanroom under renovation was an extremely challenging task," said Lisa Vidonic, the Lockheed Martin facilities engineer for the team. "Replacing the raised floor could have caused irreparable contamination in the lab, which would have meant mission failure so it was taken very seriously. Every move of every team member was carefully calculated and planned in advance in order to prevent contamination."

In addition to clean air, the technicians maintain an ultrapure water system. "The water system is one of the most critical components to maintaining a cleanroom," Holder said. "Ultrapure water is a very aggressive cleaning agent used for most everything in the lab. It behaves much like acid, yet allows us to reduce personnel exposure to hazardous chemicals."

Coordinating the planning, specifications and preparation of the cleanroom has been a well-orchestrated team effort by Stansbery, McNamara, Jack Warren, Judy Allton and Carol Schwarz. The combination of their skills and expertise proved to be the perfect blend for this project.

Warren, a Lockheed Martin curation test engineer who was the first person on Earth to open up a lunar rock box, has been with JSC since 1966. He has extensive experience working in cleanrooms. Stansbery is a specialist in space physics and was instrumental in developing the parameters for the project before it was ever approved as a Discovery Class program in 1996. Allton and Schwarz are both Lockheed Martin curation scientists. They both have been with JSC for nearly 20 years working in lunar and meteorite curation.

Certifiably Clean

The technical talents and problem-solving skills of this team lead to the creation of an unprecedented cleanroom for NASA. The Genesis laboratory recently received its ISO-4 certification and is a Class 10 cleanroom, which means it is 1,000 times cleaner than any other spacecraft assembly area throughout the Agency.

Most spacecraft are assembled in Class 10,000 rooms, which means that up to 10,000 particles of 0.5 microns in diameter are acceptable per cubic foot volume in the room. The Genesis lab has fewer than 10 particles of 0.5 microns per cubic foot volume.

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To learn more about the Genesis Mission, please visit:
http://genesismission.jpl.nasa.gov/

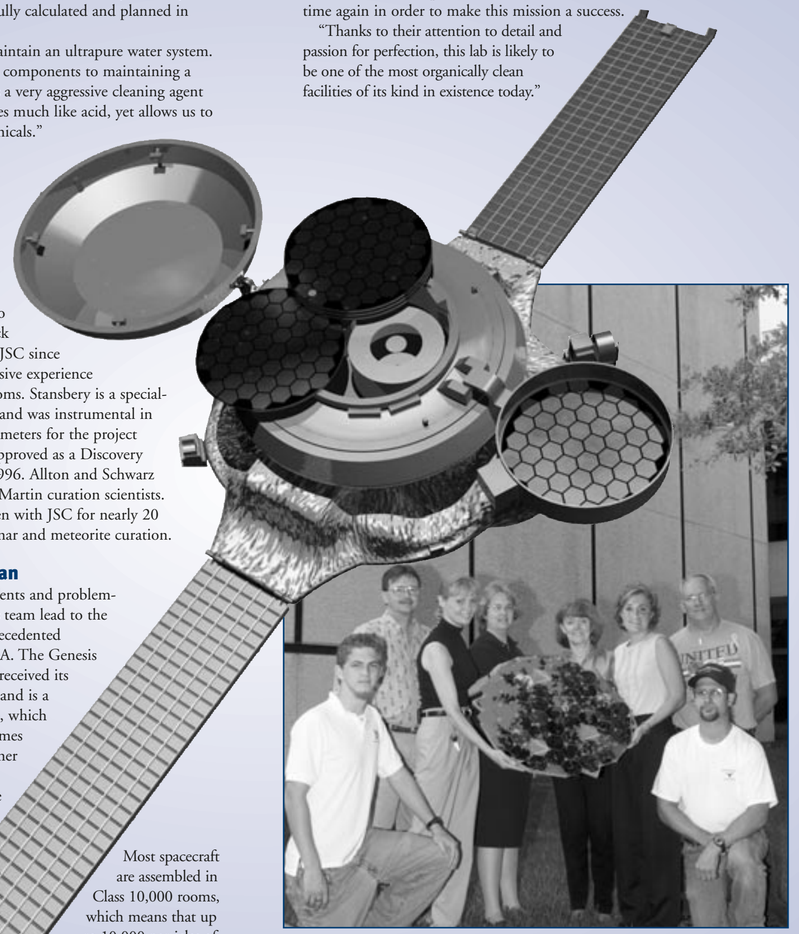
Because of its long history of outstanding performance in curating Lunar, meteorite and cosmic dust samples, JSC is the designated curation center for all of NASA's existing extraterrestrial samples. The curation facilities may also maintain samples from other countries on request in the future. One example is Japan's Muses-C asteroid mission where there are plans to curate a portion of the returned sample at JSC.

"Very few people are qualified or even sufficiently committed to work in a Class 10 cleanroom," said McNamara. "It takes an inordinate amount of dedication and discipline, and the JSC team has risen to the occasion time and time again in order to make this mission a success.

"Thanks to their attention to detail and passion for perfection, this lab is likely to be one of the most organically clean facilities of its kind in existence today."

NASA JSC 2002e24046 By Robert Markowitz

Terry Parker checks the ultrapure water filtration system in Building 31-N that provides water to the Genesis, Lunar Sampling and Meteorite labs at JSC. The system begins with reverse osmosis water, considered very clean by most standards, and then rigorously processes and filters the water to remove even the most microscopic contaminants, particles and organic material.



NASA JSC 2002e24035 By Robert Markowitz

At top is a rendering of the Genesis spacecraft. Pictured below the spacecraft, the JSC Genesis Mission Team displays an array of solar wind collectors. Kneeling are (from left to right) Jerome Hittle, intern and Ron Bastien, Lockheed Martin Electro-mechanical Technician. Standing: Jim Holder, Lockheed Martin Curation Test Engineer; Karen McNamara, NASA Project Manager; Eileen Stansbery, NASA JSC Team Lead; Carol Schwarz, Lockheed Martin Curation Scientist; Lisa Vidonic, Lockheed Martin Facilities Engineer and Terry Parker, Lockheed Martin Electro-mechanical Technician. Not pictured: Judith Allton, Lockheed Martin Curation Scientist and Jack Warren, Lockheed Martin Curation Test Engineer.

A CLOSER LOOK

Hygiene requirements and entry rules for the Genesis Laboratory

People are the greatest source of contamination in any cleanroom because they shed particles from their clothes, skin, hair and even their breath.

This is why there are stringent hygiene requirements and entry rules to which all Genesis Team members are committed. In addition to extensive cleanroom training, the team observes and lives by a daily hygiene regimen in order to work in the laboratory.

McNamara explained that it is important to eliminate organic volatiles and residues because they can create an invisible film on the lab equipment and materials, which could ultimately ruin experimental results.

Genesis Team Members must:

- Be non-smokers – any smoke residue on the body, breath or clothing can contaminate a cleanroom.
- Bathe and wash hair daily, but use no gels, mousse or scented products. Scented or oily personal care products contain excessive organics.
- Remove, prior to entry, cosmetics, including (but not limited to) hair sprays, mousses and gels; mascara, blushes, powders and foundation; nail polish; scented hand and body lotions; after shave, cologne and perfume; foot and medicated powders; medicated salves and analgesic creams. Though unscented moisturizers may be used to minimize dry skin, they should not be applied directly before entry to the laboratory.
- Prior to entry, drink at least 2 oz. of chilled water, which is provided outside of the laboratory. This helps to reduce the amount of organic particles in the breath.
- Suit-up according to cleanroom standards. This could range from a comprehensive cleanroom suit to a Dryden suit with a filtered breathing apparatus.

Other items forbidden in the Genesis Laboratory area include food, drink, gum, tobacco, smoke, cosmetics, fur, cardboard or any fibrous material, glue, flammables, jewelry, briefcases, purses, jackets or sweaters.

NASA JSC 2002e24038 By Robert Markowitz

Photo disclaimer: The above photo and the cover photo were not taken under normal operating conditions since the lab was not completed and certified at the time.